Colours and Appearances as Powers and Manifestations

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1. Introduction

Humans have only finite discriminatory capacities. This simple fact seems to be incompatible with the existence of appearances. As many authors have noted, the hypothesis that appearances exist seems to be refuted by reductio: Let A, B, C be three uniformly coloured surfaces presented to a subject in optimal viewing conditions, such that A, B, and C resemble one another perfectly except with respect to their colours. Their colours differ slightly in the following way: the difference between A and B and the difference between B and C are below the discrimination threshold, but the difference between A and C is above this threshold. According to an intuitive construal of what an appearance is, given that A and B appear (to the subject) identical in colour, A and B have the same (colour[1]) appearance P_1; likewise, B and C have the same appearance P_2. B's appearance is both P_1 and P_2. This seems to imply that $P_1=P_2$. But then, A and C also have the same appearance, which contradicts the hypothesis that A and C are discriminable. If A and C are discriminable with respect to their colour, they do *not* have the same appearance with respect to colour.

The paradox arising from such a series of judgments of sameness or difference between pairs of coloured surfaces seems to belong to the class of sorites paradoxes. Here is Armstrong's way of raising the issue.

"If A is exactly similar to B in respect X, and B is exactly similar to C in respect X, then it follows of logical necessity, that A is exactly similar to C in respect X. 'Exact similarity in a particular respect' is necessarily a transitive relation. Now suppose that we have three samples of cloth, A, B, and C, which are exactly alike except that they differ very slightly in colour. Suppose further, however, that A and B are *perceptually* completely indistinguishable in respect of colour, and B and C are *perceptually* completely

[1] If not stated otherwise, it will be tacitly understood in what follows that the appearances I speak of are colour appearances.

indistinguishable in respect of colour. Suppose, however, that A and C can be perceptually distinguished from each other in this respect." (Armstrong 1968, p. 218)

Armstrong uses the paradox arising from the non-transitivity of non-discriminability to argue against the existence of sense-data[2]. The concept of sense data has widely been abandoned for reasons independent from the present problem[3]. However, Armstrong's argument can be reconstructed so as to refute the existence of appearances, or "looks" (as we will call visual appearances) on any construal, not only in terms of sense data. When a subject looks at a uniformly coloured surface S, the colour of S will look to the subject a certain way, so that there seems to be a look, which is part of the content of her perception[4].

According to Armstrong's argument, the existence of looks (for him: sense data) is refuted by a reductio. If there were looks, they would have contradictory properties; therefore there are no looks. Here is how he presents the reasoning. "Now consider the situation if we hold a 'sensory item' view of perception. If the pieces of cloth A and B are perceptually indistinguishable in colour, it will seem to follow that the two sensory items A_1 and B_1 that we have when we look at the two pieces *actually are identical in colour*. For the sensory items are what are supposed to make a perception the perception it is, and here, by hypothesis, the *perceptions* are identical. In the same way B_1 and C_1 will be sensory items that are identical in colour. Yet, by hypothesis, sensory items A_1 and C_1 are not identical in colour!" (Armstrong 1968, p. 218).

In what follows, I will show that there is a way to construe colours and their appearances in a way that does not fall prey to the reduction just sketched.

2. An analysis in terms of powers and manifestations

The concepts of power, disposition and manifestation may help to describe the situation without any contradiction. Objective colours, as well as other perceived properties, are powers. This is certainly not a new idea. On the contrary, it is, since Locke's analysis in the Essay (1689), one of the most influential conceptions of colour, which has many followers

[2] In a similar way, Dummett (1975) argues from this paradox to the non-existence of phenomenal qualities. According to Wright (1975), it shows that colour predicates are not observational, which means that a subject cannot tell just by observation whether such a predicate correctly applies to a given surface or not.
[3] Cf. Barnes (1945), Fish (2010).
[4] This can be said independently of the metaphysical interpretation of the situation: in the perspective of adverbialist theories of perception, the way S looks to a subject T is a property of T (or of an event involving T). In the perspective of intentionalist theories, it is part of the content of a representation T forms at the occasion of this experience. Jackson and Pinkerton (1973, p. 269) are wrong in thinking that the argument can be generalized only "against any act-object, as opposed to adverbial, style of analysis of sensations".

in the 20th and 21st centuries. To mention only one of them: "I therefore elucidate colours as powers, in Locke's sense, to evoke certain sorts of discriminatory responses in human beings. They are also, of course, powers to cause sensations in human beings (an account still nearer Locke's)" (Smart 1959, p. 149).

I suggest introducing a new twist in the analysis of colours as powers, which is the key to overcoming the sorites paradox threatening the existence of appearances. Colours are what have traditionally been called "multi-track" dispositions. I think the best way to understand them is this[5]. Colours as objective properties of the surfaces of objects are powers. Such a power grounds, not a single disposition to manifest itself in one way, but a whole set of dispositions. For each context of observation of a given coloured surface, the colour grounds a disposition to appear to a given observer[6]. The appearance is a manifestation that is specific to the power, the observer, and the context.

Part of what makes the concept of colour puzzling is that a coloured surface of an object can, without itself at all changing in any intrinsic respect, vary in the way it looks, due to various changes that are external to the object and the intrinsic properties of its surface: among variations that may make the object look different with respect to its colour are changes in lighting, changes in the atmosphere and changes in the subject perceiving the object, neurophysiological or psychological. The conception of the colour of an object as a power makes it belong to the class of objectivist theories of colour. According to the power view, the physiology and psychology of the perceiving subject do not determine the *objective* colour of perceived objects, but they contribute to determining how the colour *appears* to the subject. Such appearances are manifestations of the objective powerful colour property. A given determinate objective colour can appear differently to different subjects, and to one subject at different times because one objective power grounds many different dispositions to manifest itself. Consider the set of all possible factors that may determine the look of a specific determinate colour. Triggering conditions are sets of these factors. In each situation, the power, together with the triggering condition and the laws of nature, determines how the colour will manifest itself. For each triggering situation, there is a well determined disposition: If a subject is in triggering situation T_i (composed, among other factors, of

[5] Here I use the account of dispositions and powers suggested in Kistler (2012).

[6] As one anonymous referee has suggested, it might seem simpler to cut out the concept of disposition from this picture, and just say that a power can manifest in different ways. However, the concept of disposition is useful in making explicit the relation between the power and its manifestations, especially with respect to those manifestations that are only possible but not actual. To each *possible* manifestation that the power gives objects possessing it, corresponds one *actual* disposition. Instead of saying that the power *can* manifest, i.e. does *possibly* manifest itself, in different ways, the use of the concept of disposition makes it possible to say that objects that have the power (powerful property) *actually* have a whole range of dispositions to manifest.

lighting conditions as well as neurophysiological and psychological conditions), then colour C will manifest itself in colour appearance A_i. In the context of sorites arguments, the most important dispositions are those of judging whether one colour appears the same or different with respect to a second colour. In Armstrong's example considered above, the objective colour of item B grounds (together with a great many natural circumstances, such as the presence of light, of a well functioning perceptual apparatus and nervous system) the disposition of a subject to judge that B has the same colour as A[7], in a typical situation ("triggering condition") in which she is shown B next to A. The judgment is the manifestation of the disposition[8].

Let us now have a closer look at the structure of the "sorites" argument that seems to refute the existence of appearances on the basis of a contradiction that can be derived from the fact that the indiscriminability of colours is non-transitive. Following Raffman (2000), Fara (2001), and others, I will call this argument "Nontrans". Let A, B and C be objects with very similar colours, as described in the quote from Armstrong above. The argument presupposes three principles.

(SP Sameness Principle[9]) For all objects x, y, for all subjects s of experience of type S, if x looks the same as y with respect to some perceptual dimension R, there is an appearance (or a "look"[10]) X, such that X is the appearance of x and X is the appearance of y.

(DP Difference principle) For all objects w, z, for all subjects s of experience of type S, if w looks different from z with respect to some perceptual dimension R, there is an appearance W, such that W is the appearance of w and there is an appearance Z, such that Z is the appearance of z, and $W \neq Z$.

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[7] This is not exactly the same as judging that A and B are indiscriminable. The terms "discriminable" and "indiscriminable" designate themselves *capacities*, which may manifest themselves in the long run, even if they do not in a single trial. Hardin (1988) shows that a scientific experiment may well establish that a subject can discriminate A and B in the long run, in the sense that she will more often than random judge that A is different from B, even if she will judge in many individual occasions that she can see no difference between them. More significant still, an experiment conducted with many subjects may well show that A and B are objectively discriminable even if many subjects judge them equal on many occasions, and maybe be also if some individuals always judge them equal, on all occasions. See below, section 5.

[8] I put aside here two further distinctions: 1) the judgment may or not be expressed. I take the most immediate manifestation to be the mental act (Raffman 2000, Proust 2001, 2010) of judging, whether or not it gives rise to a public expression. 2) I will also neglect the distinction between the mental act of attending to a pair of stimuli and the act of making the judgment itself (Raffman 2000, p. 158).

[9] Here is how Fara expresses the Sameness Principle: "x looks to be the same colour as y $\rightarrow \exists$c(x looks to have c & y looks to have c)" (Fara 2001, p. 914).

[10] I will use "appearance" and "look" interchangeably in this paper, except when stated otherwise: "appearance" is more general and can also be applied to sensory modalities other than vision, whereas "look" applies only to visual perception.

(UP Uniqueness Principle) For all objects x, for all subjects s of experience of type S for each respect R in which x can appear to subjects s, there is a unique[11] appearance X, such that: for all times t, if x is presented at t to s in conditions that are normal (or optimal) with respect to the perception of aspect R, then x appears to s as X.

With SP, DP, and UP, one can derive a contradiction from the existence of a situation in which indiscrimability is nontransitive. Such situations have the formal structure described in premises 1-3.

1 A looks to be the same colour as B.
2 B looks to be the same colour as C.
3 A looks to be a different colour from C.

4 (1, SP) There is a look A_1, such that A has look A_1 and B has look A_1.
5 (2, SP) There is a look C_2, such that B has look C_2 and C has look C_2.
6 (3, DP) There is a look A_3 and a look C_3, such that: A has A_3 and C has C_3 and $A_3 \neq C_3$.

7 (4, 6, UP) $A_1=A_3$.
8 (4, 5, UP) $A_1=C_2$.
9 (5, 6, UP) $C_2=C_3$.
10 (7, 8) $A_3=C_2$.
11 (9, 10) $A_3=C_3$.
12 (6, 11) $A_3=C_3$ and $A_3 \neq C_3$.

The contradiction in line 12 has been derived from three premises (1-3), together with three principles, SP, DP, and UP. Which of these premises should be abandoned?

It seems impossible to deny the possibility of situations in which premises 1-3 are all true. All three principles (SP, DP, and UP) presuppose the existence of looks. This leaves open several possibilities. One may conclude, following Armstrong, that there are no looks, which implies that SP, DP and UP are all false. But the argument does certainly not provide by itself a sufficient reason to draw such a radical conclusion. It is worth exploring other less radical options. Of the three principles, DP seems to be the least problematic. If one supposes that there are appearances, and more particularly in this case, looks with respect to colour, it

[11] X is meant to be a type, not a token.

seems unavoidable that two things that look different have different looks[12]. However, SP and UP can be questioned and have been questioned.

In what follows, I will examine some analyses of the problem raised by the apparent non-transitivity of indiscriminability that deny either SP or UP. None of them makes essential use of the notions of power and manifestation. My strategy will be to check whether these analyses can accommodate the following intuitions.

(NTI: Nontransitivity of indiscriminability) There are series of objective colours (or other objective perceivable properties) such that indiscriminability between adjacent pairs of elements of the series is non-transitive.

(EL: Existence of looks) There are looks: aspects of perceptual experience that are directly accessible to the subject and perfectly known to her, i.e. known completely and infallibly.

It will turn out that none of the analyses in the literature is compatible with both NTI and EL. However, as I will show, if looks are construed as manifestations of powers, NTI and EL can both be accepted.

Armstrong (1968) and Dummett (1975) accept NTI and deny EL. They take Nontrans to be valid, and conclude that it refutes the existence of looks by reductio. Wright (1975) argues that Nontrans shows that predicates that seem to express looks (observational predicates) are incoherent. I will not explore such radical conclusions any further here. Rather, my aim is to explore whether it is possible to acknowledge NTI and nevertheless save EL, i.e. the existence of looks. I take NTI to be uncontroversial and will not try to justify it here.

3. Denying UP

It is psychologically plausible that UP is wrong. Indeed, the appearance of some object O in a given respect does not only depend on the objective features of the object, on the physiology of the subject and the viewing conditions, but also on the context in which O is seen. In the case of colour vision, many experiments show that the appearance of the colour of O is influenced by other coloured objects which are part of the same visual scene as O. Appearances are "shifty", to use Hellie's (2005, p. 487) expression. Without UP, the reductio does not go through because a given objective property doesn't give rise to a unique context-

[12] To my knowledge, DP has not been questioned (except indirectly, by questioning the existence of appearances as such).

independent appearance, which could then be used as the middle term in a sorites argument. Without UP, step 8 in the above argument is blocked:

8 (4, 5, UP) $A_1=C_2$.

Thus, one cannot derive the fact that B's look, when seen together with A (A_1 according to step 4) is identical to B's look, when seen together with C (C_2, according to step 5).

To deny UP is to suppose that it is possible that B's appearance in the context of a judgment of comparison with A (which I will call "B_1 (A_1)") is not identical with B's appearance in the context of a judgment of comparison with C (which I will call "B_1 (C_1)"). The present hypothesis is that B_1 (C_1) may differ from B_1 (A_1). If B_1 (A_1) $\neq$ B_1 (C_1), no paradox can be constructed any more. Therefore, to avoid the paradox, it is not necessary to deny the Sameness principle as well.

Both Robinson (1972) and Jackson and Pinkerton (1973) have shown that 1) (a premise equivalent to) UP is not plausible "in view of the familiar fact of perceptual relativity" (Jackson and Pinkerton 1973, p. 270), because "the same object can have various sense data" (Robinson 1972, p. 85), corresponding to its appearance in various circumstances, and 2) without (a premise equivalent to) UP, "the paradox vanishes" (Robinson 1972, p. 85). However, it is not enough to show that UP is not true in general, in other words, that it is *sometimes* false. It must be shown that UP is false in the particular situation described by the premises of Nontrans.

Premises SP and UP seem especially plausible in that particular situation insofar as it is not made clear whether the two comparisons - of A with B and of B with C - are made 1) simultaneously or 2) in succession. On one hand, if the two discriminations are made together (at the same time, as it were in one glance), it seems indeed plausible to suppose that B's look is the same when B is seen together with A as B's look when B is seen together with C. After all, there is only one glance in which B appears. On the other hand, if these two comparisons are made separately, in succession, it appears to be a substantial assumption that B's look is the same in both comparisons.

Coloured objects are permanent substances. It is possible, or at least conceivable, that their surfaces do not undergo any change in colour during a certain lapse of time. However, the looks of such coloured surfaces of objects cannot be assumed to be substances lasting through time, and even if some sense could be made of a look lasting for some while, it would be difficult to justify the hypothesis that some aspect of that look remained constant through time. On the contrary, looks are perceptual events, or aspects of perceptual events, which are

in general subject to permanent change. Therefore, if two comparisons (A-B) and (B-C) necessarily required two successive perceptions (more precisely, two acts of comparison, which are dated mental events), there would necessarily be *two* looks, B_1 (A_1), and B_1 (C_1), corresponding to the look of B, when it is seen together with A and compared to A, and to the look of B when it is seen together with C and compared to C. But then, given the ephemeral character of looks, which is due to their dependence on context, both on what is perceived at the same time in other parts of the visual field and on what has been perceived by the subject earlier, there is no reason to suppose that these two looks, B_1 (A_1), and B_1 (C_1), are identical.

However, this reasoning presupposes that the two comparisons are necessarily made *separately*. If it were possible that the two comparisons be made with respect to *the same* look B_1, one would after all have constructed a situation which leads to a contradiction (and thus refutes the existence of looks).

Both Robinson (1972) and Jackson and Pinkerton (1973)[13] argue that there are necessarily two looks in play, so that no sorites argument can be constructed and no contradiction follows. According to Jackson and Pinkerton, the hypothesis that the same look (of B: B_1) is involved in the comparison of A and B and in the comparison of B and C is "logically impossible" (Jackson and Pinkerton 1973, p. 270). "The suggestion that A might look to be the same colour as B, B might look to be the same colour as C, while A looks to be a different colour from C, to one and the same person at one and the same time, is inconsistent", because this "the suggestion involves one object, B, looking to have two different colours at the same time to the same person, which is impossible" (Jackson and Pinkerton 1973, p. 271). They agree with Armstrong that this leads to a contradiction, and conclude that the hypothesis of the existence of a unique B_1 must be rejected[14].

However, it remains to be seen whether Robinson's and Jackson and Pinkerton's defense of the existence of sense data can be adapted to a conception of colour perception that does not make use of sense data but only of objective colours and colour appearances. In what follows, I shall propose an analysis that 1) justifies abandoning UP while 2) retaining SP and EL and 3) is compatible with NTI. Being only concerned with appearances (conceived as sense data), neither Robinson (1972) nor Jackson and Pinkerton (1973) raise the latter issue with respect to indiscriminability judgments bearing on *objective* colours of surfaces. However, with respect to the appearances of A, B and C, the question of transitivity cannot

[13] Their strategy is taken up by Raffman (2000) and Fara (2001).
[14] The difference with Armstrong's conclusion is that they conclude only that UP should be abandoned (there can be, in this situation, no unique look involved in two comparisons), where Armstrong takes it that the contradiction justifies the more generally conclusion that there are no looks.

even be asked: if UP is false, there is no common look of B, which could be used as a "middle term" in a sorites argument.

Once objective colours are taken into consideration, we can construct an even stronger argument against UP. If UP were true, i.e. if there was a one-one correspondence between the objective colours A, B, C and their looks A_1, B_1, C_1, colours (and the objective properties of the objects of perception in general) would be single-track dispositions, as it is tacitly understood in the traditional Lockean analysis. However, and surprisingly, if colours were single-track dispositions, then, given the one-one correspondence of B and its unique manifestation B1, Nontrans would refute not only the existence of looks but also the existence of objective colours, which manifest themselves by their looks.

Here we seem to have a place where "powers may be put to work". The metaphysical analysis of the relations between powers, dispositions, and manifestations shows how reality must be structured so that 1) UP can be false, whereas both 2) EL and (3) NTI are true. I will make a suggestion along these lines in section 7 below.

4. Denying SP, supposing that representations of colours are exact: Goodman/Clark

The most influential strategy to avoid the refutation of looks by Nontrans has been introduced by Goodman (1977) and further developed by Clark (1993). In terms of our analysis of the logical form of Nontrans, this strategy can be interpreted as based on the rejection of the Sameness Principle[15]. Goodman and Clark deny that the fact that two objects look the same with respect to colour suffices to establish that there is a property, traditionally called appearance or look, that is directly apparent to the subject. Supposing that such a property exists leads to the sorites contradiction. However, contrary to Robinson and Jackson and Pinkerton, Goodman and Clark's aim is not merely critical. Indeed, Clark provides a positive metaphysical interpretation of colours and looks, which goes beyond finding a way of avoiding the conclusion of Nontrans. Discrimination and difference judgments are made by subjects on the basis of the perception of objects. Although these judgments bear on external objects, they must be made on the basis of some representation which has psychological reality. The challenge is to account for this psychological reality without falling into the trap of the sorites argument. Goodman and Clark's strategy is to introduce a new kind of entity

[15] See Fara (2001).

that is supposed to take over the role of looks, but differs from looks in being immune to sorites arguments. "Qualia", as Goodman and Clark call them, are psychological entities for which there is no principle equivalent to the Sameness Principle. No sorites argument refutes their existence even if all other premises are kept, including the Uniqueness Principle.

Qualia are defined indirectly, with the help of the concept of matching: x and y match it they look the same[16]. Two qualia x and y are identical if they do not only match each other but if for all other qualia z, either z matches both x and y, or z matches neither x nor y[17]. Qualia thus conceived have coherent identity conditions and do not fall prey to any sorites argument. The reason is that they do not obey to any principle of the form of the Sameness Principle. It is not the case that for all objects x, y, if x looks the same as y with respect to R ("if matches y with respect to R"), there is a quale Q such that Q is both part of the content of the representation of x and part of the content of the representation of y. It is crucial for the concept of qualia that matching of two perceived objects with respect to R is not sufficient for the sameness of the qualia caused by the perception of x and y. x and y may well match although the qualia by which an observer represents them are not the same. This happens precisely in the situation described by the premises of Nontrans. The fact that B matches A is not sufficient for their qualia Q(A) and Q(B) to be identical. On the contrary, the fact that there is a third item C which matches B without matching A, establishes that qualia Q(A) and Q(B) are not identical.

The problem with this strategy is that it changes the subject rather than solving the problem. The aim was to understand how there can be looks although their existence seems to be refuted by Nontrans. Goodman and Clark reply that there are no looks, but that their role can be taken over by qualia. Qualia in Goodman's and Clark's sense are the content of representations. They are theoretical properties postulated in order to explain judgments of perceptual similarity and dissimilarity (Shepard 1962; 1965). Qualia are subjective, because they are the content of representations which are partly determined by constraints imposed by the subject, in particular by its neurophysiology. However, qualia, as defined by Goodman and Clark are not looks as we use the concept in this paper[18] because qualia are not known 1) directly nor 2) completely nor 3) infallibly by the subject that has them.

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[16] Goodman (1977, p. 197) takes the predicate "match" to be basic and provides no analysis.
[17] Cf. Goodman (1977, p. 196).
[18] Armstrong considers the possibility of conceiving sense data in a similar way, and criticizes it for similar reasons. "The upholder of sensory items" says Armstrong, may "abandon the view that we have incorrigible knowledge of the nature of the items at the time of having them" (Armstrong 1968, p. 219). As Armstrong notes, such a doctrine would be paradoxical, in the sense that it is incompatible with a central tent of the sense datum doctrine. Sense data are defined by the fact that the appearance-reality distinction does not apply to them: They

It is part of the concept of a look (or in general, of an appearance) that it is possible for the subject to acquire *direct* knowledge of how things look (or appear) to her. It is essential for looks that knowledge of the sameness or difference of the looks of A and B can be acquired directly: if A_1 and B_1 are looks it is sufficient for the subject to inspect A_1 and B_1 themselves to know whether they are identical or not. However, the subject cannot tell by direct inspection alone whether two items A and B produce the same quale in her psychological quality space. The fact that they look exactly the same ("match") with respect to some dimension of perceivable qualities, such as colour, is necessary but not sufficient. If there is a third item C that looks different from one (say A) but looks the same as the other (B), (in Goodman's terminology: if there is C which matches B but not A), the quale Q(A) by which the subject represents the colour of A is not identical with the quale Q(B) by which the subject represents the colour of B. The crucial point is that there are situations where QA≠QB but where the subject cannot by introspection directly acquire knowledge that QA≠QB.

Moreover, even if A and B match and if it is in fact true that QA=QB, the subject can never *be certain* that QA=QB: It is impossible for the subject to check all third items, which might possibly reveal that QA≠QB. The identity QA=QB always remains hypothetical. Depending on what is taken to be sufficient for knowledge, the subject might nevertheless be said to know that QA=QB. Even then however, qualia are not looks because such knowledge is not direct: knowledge that QA=QB requires inspection of items that are different from both A and B.

With the help of the concept of qualia, it is possible both 1) to accept that indiscriminability is non-transitive (NTI), and 2) nevertheless to maintain that there is something, the quale, that has psychological reality and accounts for the way things appear to a subject. However, qualia are not looks. Insofar as the Sameness Principle bears on looks, it is paradoxical to deny it[19]. Denying it means denying that a subject can tell just by looking

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are what they appear to be. Thus it is impossible to say of a sense datum that the very subject to whom it appears ignores what it is; for this presupposes that the way it appears to her (and which she knows by immediate introspection, or acquaintance) is not what it really is. Broad (1923, p. 244) seems to take sense data to be only incompletely known. This seems to be incompatible with the very notion of a sense datum. We might take this to be a verbal issue: What Broad calls sense data just are not sense data, in the sense of what appears necessarily as what it is, and about which the subject cannot be ignorant. Rather, they might be powers to give rise to sense data: powerful properties of the perceptual experience.

[19] Fara says that it is a "truism" (2001, p. 909) that "if any two colour patches look the same, then if one looks red so does the other" (2001, p. 908). She also says that it would be confused to attribute an observational predicate such as being red to one object and to deny it to a second item if these two items look the same: "I cannot see my way through to the possibility that two colour patches might look the same, yet that 'looks red' applies to one but not to the other" (Fara 2001, p. 909). Armstrong says that Goodman's strategy, namely "abandon the view that we have incorrigible knowledge of the nature of the items at the time we have them" (Armstrong 1968, p. 219), while it is not logically absurd, "is nevertheless most implausible". Jackson and

how things look to her, and denying that a subject can know whether two things that look the same really have the same look. It is not paradoxical if the subject's (partial) ignorance it taken to bear, not on how things look, but on the qualia by which their perceptible qualities are represented. But then, the paradox arises if qualia are supposed to be appearances which do not directly appear to the subject.

The fact that qualia do not satisfy the conditions we have imposed on looks is no reason to deny that they are real. Rather, they can be understood as being real powers. Just as a subject of perception has only incomplete knowledge of the objective properties she perceives, she has only partial knowledge of her own qualia. Each manifestation gives the subject partial knowledge: looks reveal part of the nature of objective colours, but also part of the nature of her own qualia. The fact that a subject judges that A and B "match" means that the objective colours are very similar, but also that the qualia Q(A) and Q(B), by which she represents these objective colours lie close together in her psychological quality space.

5. Denying SP, supposing that representations of colours are inexact: Hardin

According to Hardin (1988) it is an illusion that looks (and apparent colours in particular) fall prey to sorites arguments. It stems from an oversimplified conception of looks, according to which a look can be exhaustively determined and known by one subject at one instant. He shows that this is not the only way to conceive of the psychological basis of perceptual appearance, and furthermore that there is an alternative, scientific way of conceiving that basis. The value of the scientifically measurable properties in this basis, which Hardin misleadingly calls "looks" although, as I shall argue, they are not looks in our sense, can be determined by statistical means. Hardin claims that, understood in this way, "looks" are immune against refutation by sorites arguments. "If we are prepared to count statistical ensembles of observations and observational data – a quite common practice in science – Nontrans […] must be rejected" (Hardin 1988, p. 214). Furthermore, the construal of looks as objective theoretical properties, which can be determined by direct introspection only to a finite degree of precision, paves the way for a coherent "concept of phenomenal

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Pinkerton agree that "it is not open to the sensory item theorist to argue that in the kind of case described in the above quotation [the non-trans case; MK] the percipient is mistaken about the nature of his sensory items" (Jackson and Pinkerton 1973, p. 269).

color", according to which phenomenal colours "are often indeterminate" (Hardin 1988, p. 214)[20].

The statistical treatment of comparisons between colours shows that the judgments subjects make of a given pair of colours are not constant, neither for the same subject over time, nor within a group of different subjects. Rather, such judgments are spread out in a way one would expect from a process in which noise is added to the process of signal treatment[21]. One can assume that the factors producing this "noise" are "randomly distributed and thus representable by a normal (Gaussian) distribution curve" (Hardin 1988, p. 215). As a result, the scientific construal of the appearance of a colour is not a point in colour space (the space corresponding to the contents of perceptual representations) but an imprecise value, spread around a mean value with a distribution that can be characterized by its standard deviation. According to Hardin, this is sufficient to show that "the sorites problem does not arise" (p. 220). If looks are construed as imprecise theoretical properties, each with its mean value and standard deviation, their distributions can overlap. The sorites paradox arises as long as one identifies represented properties with single looks, on the basis of single comparison judgments of one individual subject at one occasion.

To one individual (to use our own symbols introduced above), B_1 can seem to be the same apparent colour as A_1, and also seem to be the same apparent colour as C_1. However, statistical sampling of many judgments of one subject, and of many subjects, will show that the look B_1 is neither identical with A_1, nor with C_1. Instead, their characteristic distributions overlap. The points in the overlap zone correspond to judgments according to which the two looks are equal.

In the terms of the premises of Nontrans we have distinguished above, Hardin denies SP: The observation of a statistically significant sample of comparison judgments of a given pair of items (within the triple A, B, C that gives rise to the sorites paradox), say A and B, will show that the representations R(A) and R(B) are not identical although they may be judged to look equal for many individuals at many occasions.

However, Hardin's account accepts UP not only as a plausible empirical hypothesis. UP is built into the construal of phenomenal properties: the phenomenal property as which a given item A appears to subjects of a given type is defined as the statistical distribution of the individual appearances, as they are manifested in various comparison judgments. All

[20] Hardin takes care to distinguish this thesis from the claim that it is "just phenomenal color *predicates* [my emphasis] […] [that] are often indeterminate" (Hardin 1988, p. 214).
[21] Discriminating between colours can be represented as the extraction of "a signal which is transmitted over a noisy channel" (Hardin 1988, p. 215). This idea is taken up by Hellie (2005).

appearances of one item, to the same subject and to different subjects, are integrated in the unique phenomenal property.

Hardin's account does not adequately solve our problem of showing that EL and NTI are compatible, for two reasons.

1. Hardin's "phenomenal colors" (1988, p. 214) are not appearances or looks at all. They are theoretical properties, constructed according to a scientific methodology, from a third person perspective, on the basis of a statistical evaluation of many first person appearance judgments. Knowledge of such "phenomenal properties" can only be acquired indirectly. It would be more appropriate to call appearences or looks "phenomenal properties". Hardin's "phenomenal properties" are ill named: There is no subject to whom they appear at any time and who knows them directly, by how they appear. As Goodman's and Clarke's defence of qualia against the sorites paradox, phenomenal colours as construed by Hardin's are a Pyrrhic victory against the sorites refutation of appearances: Hardin shows that there is a property that does not fall prey to the refutation; but it is not an appearance.

2. Moreover, Hardin's construal of phenomenal properties as objective measurable quantities with a mean value and standard deviation, obtained from the statistical treatment of many appearance judgments, does not solve the problem in all generality. As Hardin himself admits, "the sorites argument could be resurrected" (Hardin 1988, p. 220) with a series of phenomenal colours that are so close together that their difference could not even be detected by statistical means, on the basis of a large set of individual comparison judgments. If the objective difference in the stimuli is so small that it would take a very large number of trials to detect a subjective difference in the ways these stimuli appear to subjects, it seems practically impossible to avoid changes in the experimental situation. In such cases, "the signal gets buried in the noise" (Hardin 1988, p. 220). This means that, given the practically limited number of trials, the distribution curves that ground the objective distinctness of different looks are themselves not infinitely sharp. As a consequence, there are "phenomenal colours", i.e. distribution curves, that are so close together that they cannot be distinguished by statistical means. Sorites arguments can be constructed with respect to such phenomenal colours. A series of very close distribution curves can serve as premises of an argument that has exactly the same structure as Nontrans. There is a series of phenomenal colours, such that they appear equal even in the long run to a large group of observers, although the first and last in the series appear different to them. Therefore, there are no such

phenomenal colours, scientifically construed on the basis of the statistical evaluation of a large number of appearance judgments[22].

Hardin's own reply to this problem is that "it doesn't arise in everyday color-attributing practice" (1988, p. 221), and that it has "little bearing on a rational reconstruction of the rules governing color predicates in a public language since such predicates are necessarily *much* coarser than the fine grains of just noticeably different colors perceivable by particular individuals" (1988, p. 221). This fact shows that the problem doesn't threaten the meaning of ordinary language predicates[23]; however, it does not save the existence of "phenomenal colors" from refutation by sorites arguments.

6. Denying SP, supposing that representations of colours are inexact: Hellie

Both Hellie (2005) and Zeimbekis (2009) argue that the paradox of Nontrans can be avoided by conceiving perceived qualities as determinables, corresponding to regions, not points, in quality space.

Let us suppose that phenomenal qualities, such as colours, sizes and shapes, are representations in a psychological quality space, i.e. a psychological space of the content of the representations of perceived qualities (Shepard 1962; 1965). Let us suppose that hues can be represented in a 2-dimensional surface in a psychological colour space (Shepard 1962). Determinate and determinable predicates and properties can be ordered in a series: coloured is a determinable relative to red, and red is a determinable relative to scarlet. Each determinable colour corresponds to a part of the colour surface. The higher a represented colour is in the determinate-determinable hierarchy, the larger is the corresponding surface: the surface corresponding to scarlet is a proper part of the surface corresponding to red. "Super-determinates" (Funkhouser 2006) lie at the bottom of the hierarchy: they are perfectly determinate and correspond to points in the psychological quality space.

Zeimbekis argues that the empirical limitations in the discrimination powers of any real cognitive system make it "impossible for any discrimination system to discriminate super-determinate shape and size properties" (Zeimbekis 2009, p. 352). He concludes that "phenomenal sizes and shapes are determinable types" (Zeimbekis 2009, p. 346), in the sense

[22] In a similar vein, Raffman (2000) judges that « the statistical relation defined by the psychologists seems equally likely to be nontransitive: there are or can be three stimuli A, B, and C such that, e.g. A and B are judged different only 40 percent of the time (hence are indiscriminable), and similarly B and C, but A and C are judged different 70 percent of the time (hence are discriminably different). » (2000, p. 157).

[23] Therefore, it can be used as a defense against Wright (1975).

that each phenomenal size corresponds to a whole region of determinate objective sizes. However, Zeimbekis does not conclude that phenomenal appearances are determinables *as appearance*s, i.e. in the sense of corresponding to an extended region of representations. For Zeimbekis, appearances are determinables only relative to the objective properties they represent. "Phenomenal sizes […] stand in a determination relation to objective sizes" (Zeimbekis 2009, p. 353).

By contrast, Hellie (2005) takes phenomenal properties, i.e. representations of objective properties acquired through perception, to be "inexact" *as appearances*, in the sense that the identity of a phenomenal property corresponds to an extended region in the psychological space of representation. Hellie represents the situation establishing the non-transitivity of indiscriminability in the following way: R(A, *e*) is the representation of a colour A in experience *e*. It corresponds to a region in psychological quality space that contains A. According to Hellie, the fact that A and B are indiscriminable in experience *e* means that the representations of the colours of A and B overlap: There can be "indiscriminability without sameness of representation" (Hellie 2005, p. 485). This is equivalent to a denial of (SP).

Hellie explicitly makes the hypothesis that the phenomenology of the represented properties has exactly the same structure as the representations. The consequence is that the subject does not perfectly well know the phenomenal properties. His account "allows for indiscriminability without sameness of phenomenology" (Hellie 2005, p. 496). In this sense, Hellie's analysis suffers from the same defect as Hardin's: Representations corresponding to extended surfaces in psychological quality space are not looks and should better not be called "phenomenal", because the subject does not know them directly and exhaustively. In particular, the subject who perceives A and B, which look the same, does not know just by looking (in experience *e*) whether A's and B's phenomenal colours R(A, *e*) and R(B, *e*) are identical or just overlapping. I take it to be incompatible with the notion of phenomenology that there are phenomenological facts that are not directly accessible to the subject herself.

7. Looks as Manifestations of Powers

Let us take stock, and answer the question we have started with, whether there is a way to account for the phenomena of appearance that is compatible both with

(EL Existence of looks) There are looks: aspects of perceptual experience that are directly accessible to the subject and perfectly known to her, and

(NTI Nontransitivity of indiscriminability) There are series of objective colours (or other objective perceivable properties) such that indiscriminability between adjacent pairs of elements of the series is non-transitive.

We have seen that it is possible to acknowledge the possibility of situations such as those described by the premises of Nontrans, and still avoid the contradiction that Nontrans derives from these premises. This is possible by rejecting at least one of DP, UP or SP, without rejecting the existence of looks as such. I have argued that DP and SP cannot be rejected without threatening the existence of looks and the intuition that they are directly and completely known by the subject, by the very experience in which they are present to the subject. A subject would not know how things appear to her if it were possible (as it is if SP is denied) that 1) she judges A and B to look the same, but that nevertheless 2) the look of A differs from the look of B. Thus, the existence of looks can only be justified if SP is maintained. The same reasoning shows that the existence of looks requires DP: A subject would not know how things appear to her if it were possible (as it is if DP is denied) that 1) she judges A and B to look different, but that nevertheless 2) the look of A is identical to the look of B. Abandoning SP or DP is equivalent to abandoning the idea of looks as immediately and perfectly known to the subject on the basis of the very experience of having them. In other words, SP and DP are constitutive of the conception of looks as immediately and completely known to the subject. If two things look the same with respect to R, there is a look they share; and if two things look different with respect to R, there are two different looks.

At this point, the only way to save the existence of looks from contradiction is by dropping UP. We have already seen that this fits well with the hypothesis that colours and other perceptible properties are "multi-track" powers. Given that the context contributes to determine how things appear, how an object looks to subject S_1 will in general differ from how it appears to subject S_2, even if viewing conditions are normal, or optimal; and how an object looks to S_1 at t_1 will in general differ from how it looks to S_1 at t_2. For each perspective and each context, there is a different disposition grounded on the relevant properties of the object, to manifest itself in the mind of an observer. This is equivalent to the negation of UP: it means that it is not the case that a given object manifests itself, with respect to a given perceptible aspect, such as colour, with a unique look.

There remains an important obstacle on the way to an adequate construal of looks. We have found that extant analyses of appearances, qualia, or "phenomenal colours" are all incompatible with EL, according to which looks are immediately and completely known to

the subjects to which they appear, by the very fact that they appear to the subject. On the other hand, Robinson's and Jackson and Pinkerton's analysis justifies the existence of looks, but only in the framework of the theory of sense data. In that framework, NTI does not make sense because discrimination judgments are not taken to bear on objective colours, but rather on sense data.

I can here only sketch how manifestations of powerful objective colours can comply with the intuitive constraints expressed in EL. This is possible if looks are construed as (parts of) the contents of acts of comparison. Let us suppose that these acts are judgments[24]. According to this hypothesis, if a subject judges that A looks the same as B, A's look is constituted by the fact that it is equal to B's look. If the subject judges that A looks similar or different from B with respect to its colour, A's look consists in A's similarity or difference with respect to B's look. The only way to comply with EL is to suppose that the content of the judgment exhausts the appearance: there is nothing more about the look of A than how S judges it to be at a given moment. Of course, this hypothesis raises a lot of new questions. One may immediately worry that this account of appearances gives rise to a regress: the look of A can only be constituted by a judgment of its sameness or difference with respect to B if the look of B is already known.

The hypothesis that appearances are constituted by acts of comparison has important consequences. One consequence is that it is incompatible with the thesis of the representational theory of phenomenal consciousness (Dretske 1995) that a subject's representing a property is sufficient for the property to appear to the subject. Our hypothesis leads to the result that representing a property is not sufficient for the property's appearing to the subject. Perceptual judgments require representations because they are mental acts that have representations as objects; but the very existence of the representations does not guarantee that the subject directs her attention to them nor that she will make a judgment bearing on them. Phenomena such as change blindness and inattentional blindness[25] seem to be incompatible with a pure representational theory, insofar as they seem to show that a subject can represent many things and events without their appearing to her. Our hypothesis can account for these phenomena. The hypothesis that the appearance results from a

[24] Raffman suggests that looks are constituted by judgments. "I shall speak indifferently of patches' *looking red* and *being judged to look red*" (Raffman 1994, p. 45; emphasis Raffman's). According to Raffman, looks can arise either from discriminatory judgments, which I am presently considering, or from categorical judgments, when one colour is judged to belong to a perceptual category stored in memory. It is controversial whether there is a notion of judgment that can be applied the comparison judgments I am considering and that does not rely on the use of concepts. If all judgments make use of concepts, the hypothesis remains open that at least some appearances precede such judgments (Zeimbekis 2012).

[25] Most (2010).

perceptual judgment fits with the fact that a subject is "blind" to objects and events it represents but to which it does not direct its attention. Perceptual judgment requires directing one's attention to a perceived object or fact. Here is a question which calls for further empirical and conceptual work: is perceptual attention in itself sufficient for making things appear, or do they only begin to "look" a certain way once they have been made objects of perceptual judgments? We cannot explore such questions here; however, they suggest that it is fruitful to conceive appearances as manifestations of powers.

Conclusion

Starting with an analysis of a famous apparent paradox arising from a series of judgments of perceptual comparisons with stimuli so similar that their difference lies under the discrimination threshold, our aim was to find out whether there is a metaphysical picture of perception and its objects, which allows discrimination between objective colours to be non-transitive, and still makes room for the existence of what I have called "looks", or more generally "appearances". I have taken looks to be defined by the possibility for the subject to know them immediately, exhaustively and infallibly. I have suggested that this is possible if colours and other objective properties that are objects of perceptual judgments, are "multi-track" powers. Each occasion of comparison between two perceptible items is a triggering condition, relative to which the power gives rise to a disposition to appear in a certain way to a given type of cognitive subject. If the subject makes a comparison judgment, the item appears to her in a way constituted by the judgment. The appearance results from a cognitive act of the subject, and is therefore directly and completely knowable by the subject.

All other accounts of appearances we have examined either construe appearances as sense data (Robinson, Jackson and Pinkerton) or as contents of permanent representations. Such permanent representations as "qualia" (Goodman and Clark) and "phenomenal properties" (Hardin, Hellie) are powers rather than manifestations of powers, in the sense that they are not directly and completely manifest to the subject. The content of representations, whether sharp or "determinate" (Goodman, Clark) or spread out or "determinable" (Hardin, Hellie), can only be explored and completely known with scientific methods. Such representations and their contents are not looks in our sense because they are not immediately accessible to the subject.

If looks are construed as contents of perceptual judgments, they are ephemeral, in the sense that their existence is limited to a particular situation. This is a consequence of the fact

that they are manifestations rather than powers. Here lies the main difference between our proposal and the accounts we have considered. Permanent representations, such as Goodman's qualia and determinable qualities in a psychological space, are powerful properties. Just as objective powerful properties (such as the objective colours of perceived objects), the representations a subject forms of the colours she perceives are powerful properties of the subject. Both are only indirectly accessible to the subject. The subject acquires new partial knowledge on both objective and subjective powerful properties each time she makes a perceptual judgment. Each acquisition of such partial knowledge gives rise to an appearance, so that the appearance itself is completely knowable by the subject. However, this knowledge concerns only an ephemeral manifestation, not a power, and is therefore of very limited use[26].

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